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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/689,297	10/11/2000	Hitoshi Kihara	SHX 314	1159
23581	7590	11/06/2003	EXAMINER	
KOLISCH HARTWELL, P.C. 520 S.W. YAMHILL STREET SUITE 200 PORTLAND, OR 97204			LEUNG, JENNIFER A	
			ART UNIT	PAPER NUMBER
			1764	

DATE MAILED: 11/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/689,297	KIHARA ET AL.	
	Examiner	Art Unit	
	Jennifer A. Leung	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18,25-36 and 45-52 is/are pending in the application.
- 4a) Of the above claim(s) 18 and 25-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 45-52 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 18,25-36 and 45-52 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 21 August 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____. | 6) <input type="checkbox"/> Other: _____. |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on August 21, 2003 has been received and carefully considered. The changes made to the drawings are acceptable. Claims 1-17, 19-24 and 37-44 are cancelled. Claims 18 and 25-36 are withdrawn. Claims 45-52 are added. Claims 18, 25-36 and 45-52 remain active.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 45 and 46 are rejected under 35 U.S.C. 102(b) as being anticipated by Tervoort et al. (US 3,625,835).

Regarding claim 45, Tervoort et al. (FIG.; column 2, line 30 to column 3, line 8) discloses an apparatus comprising a plurality of distillation columns constructed in cascade (**A** and **B**);

wherein each of the columns comprises a reboiler and a condenser (i.e., column **A** with reboiler **C** and condenser **E**; column **B** with reboiler **D** and condenser **F**); liquid drawn from the columns being introduced into the reboilers (i.e., liquid from column **A** introduced via line **3** to reboiler **C**; liquid from column **B** introduced via line **15** to reboiler **D**); vapor drawn from the columns being introduced into the condensers (i.e., vapor from column **A** introduced via line **7** to condenser **E**; vapor from column **B** introduced via an unlabeled line to condenser **F**);

wherein an outlet (via line 6) of the reboiler C of the first column A is connected (indirectly) to an inlet of the condenser F (inlet line not labeled) of the second column B via introduction conduit 11, which introduces vapor drawn from the reboiler C of the first column A into the condenser F of the second column B (i.e., the liquid-vapor mixture exiting reboiler C in line 6, wherein some vapor is inevitably condensed within column A and passed on to column B via line 11); and

wherein an outlet of the condenser F of the second column B is connected (indirectly, via line 3) to an inlet of the reboiler C of the first column A via a return conduit (unlabeled, passing through pump 13), which returns liquid drawn from the condenser F of the second column B into the reboiler C of the first column A.

Regarding claim 46, Tervoort et al. (FIG.; column 2, line 30 to column 3, line 8) discloses an apparatus comprising a plurality of distillation columns constructed in cascade (A and B);

wherein each of the columns comprises a reboiler and a condenser (i.e., column A with reboiler C and condenser E; column B with reboiler D and condenser F); liquid drawn from the columns being introduced into the reboilers (i.e., liquid from column A introduced via line 3 to reboiler C; liquid from column B introduced via line 15 to reboiler D); vapor drawn from the columns being introduced into the condensers (i.e., vapor from column A introduced via line 7 to condenser E; vapor from column B introduced via an unlabeled line to condenser F); and

wherein an outlet 6 of the reboiler C of the first column A is connected (indirectly) to the top of the second column B via introduction conduit 11, which introduces vapor drawn from the reboiler C of the first column A into the second column B (i.e., the liquid-vapor mixture in line

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6, of which some vapor inevitably condenses, is passed on to column **B** via line 11); and

wherein an outlet of the condenser **F** of the second column **B** is connected (directly) to the bottom of the first column **A** via a return conduit (unlabeled, passing through pump 13), which returns liquid drawn from the condenser **F** of the second column **B** into the first column **A**.

Instant claims 45 and 46 structurally read on the apparatus of Tervoort et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 47 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tervoort et al. (US 3,625,835) in view of Glitsche et al. (US 3,969,447) OR Chen et al. (US 4,604,247).

Regarding claim 47 and 50, Tervoort et al. disclose column **A** may comprise a structured packing such as Pall rings over a height of 20 feet, equivalent to four theoretical plates, and column **B** may comprise 13 actual plates, equivalent to four theoretical plates (column 3, lines 14-15, 42-44). Although Tervoort et al. are silent as to whether the structured packing of column

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A may instead comprise the recited promoting-fluid-dispersion type or non-promoting-dispersion type structured packing, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to substitute the recited structured packing for the Pall ring structured packing in the apparatus of Tervoort et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, since substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and furthermore, the use of structured packing of the type recited for distillation is conventionally known in the art, as evidenced by Glitsche et al. or Chen et al. In particular, Glitsche et al. teach a non-promoting-fluid-dispersion type structure packing **30** comprising a honeycomb or lattice structure (FIG. 1, 2, 2A). Chen et al. teach a promoting-fluid-dispersion type structure packing **10** comprising a plurality of wave-shaped thin plates **12** disposed parallel to the column axis and made into the form of a block by layering the plates in contact with one another (FIG. 1, 2, 4, 5).

4. Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carney (US 1,957,818).

Regarding claims 45 and 46, Carney (FIG. 1; page 2, lines 13-64) discloses an apparatus comprising a plurality of distillation columns constructed in cascade (rectifying columns **1-4**);

wherein each of the columns comprises a reboiler (i.e., the region comprising the base of columns **1-4**, having heating elements **7, 18, 32, 46**) and a condenser (reflux condensers **11, 25, 39, 50** having cooling coils **12, 26, 40, 51**); liquid drawn from each of the columns being introduced into the reboiler (i.e., via down-flow of the liquid phase), and vapor drawn from each

of the columns being introduced into the condenser (i.e., via vapor lines 10, 24, 38, 49); and

wherein an outlet (via pipe 19) of reboiler 18 of a first column (i.e., rectifying column 2) is connected to the *intermediate portion* of a second column (i.e., rectifying column 1) via introduction conduit 22; and an outlet (via pipe 13) of condenser 11 of the second column 1 is connected to the *intermediate portion* of the first column 2 via return conduit 16.

In terms of claim 45, the figures (FIG. 1-3) fail to show,

- i) the outlet 19 of reboiler 18 of the first column 2 connected to the *inlet 10 of condenser 11* of the second column 1 via introduction conduit 22; and
- ii) the outlet 13 of condenser 11 of the second column 1 connected to the *inlet of reboiler 18* of the first column 2 via return conduit 16.

In terms of claim 46, the figures (FIG. 1-3) fail to show,

- iii) the outlet 19 of reboiler 18 of the first column 2 connected to the *top* of the second column 1 via introduction conduit 22; and
- iv) the outlet 13 of condenser 11 of the second column 1 connected to the *bottom* of the first column 2 via return conduit 16.

However, Carney discloses, “[i]t is understood that in this fractionating system, the top product and bottom product back feed are introduced into the preceding column *at a point where the liquid of the column is in accordance with the composition of the back feed material*. In this system, as in any other herein described, *the points of reintroduction of either top or bottom back-feed are determined by its composition*,” page 3, lines 101-109. (with emphasis added).

For this reason, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select appropriate connecting locations (such as the connecting

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locations recited in claims 45 and 46) for the introduction and return conduits of the apparatus of Carney, since the precise connecting locations would have been considered result effective variables based on the composition of the back feed material and the corresponding composition location in the preceding column, as taught by Carney, and one having ordinary skill in the art would have routinely optimized the connecting location of the conduits in the system in order to obtain a desired product separation. *In re Boesch*, 617 F.2d. 272, 205 USPQ 215 (CCPA 1980). Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

5. Claims 47 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carney (US 1,957,818), as applied to claims 45 and 46 above, and further in view of Glitsche et al. (US 3,969,447) OR Chen et al. (US 4,604,247).

Regarding claims 47 and 50, Carney discloses rectification columns 1-4 comprise conventionally known plate-type columns (page 3, lines 19-37). Carney is silent as to whether the columns 1-4 may instead comprise at least one packed column having the recited promoting-fluid-dispersion type or non-promoting-dispersion type structured packing. In any event, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to substitute the recited structured packing for the column plates in the apparatus of Carney, on the basis of suitability for the intended use and absent showing any unexpected results thereof, since substitution of known equivalent structures involves only ordinary skill in the art, *In re Fout* 213 USPQ 532 (CCPA 1982); *In re Susi* 169 USPQ 423 (CCPA 1971); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *In re Ruff* 118 USPQ 343 (CCPA 1958), and

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furthermore, the use of structured packing of the type recited for distillation is conventionally known in the art, as evidenced by Glitsche et al. or Chen et al. (the same comments with respect to Glitsche et al. and Chen et al. apply).

6. Claims 45, 46, 48, 49, 51 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spevack (US 4,788,051) in view of Tervoort et al. (US 3,625,835) OR Carney (US 1,957,818).

Regarding claims 45, 46, 48, 49, 51 and 52, Spevack discloses an apparatus comprising an isotope concentrating system (I) and a feed isotope regenerator (II). (Abstract; FIG. 1; column 3, lines 45-55; column 4, lines 3-46). The isotope concentrating system (I) may comprise an isotope concentration system of any suitable form, such as "a conventional water distillation system," wherein the distillation system may comprise a phase conversion element **203** (i.e., boiling device, reboiler) and a phase conversion element **204** (i.e., condensing device, condenser), (column 4, lines 14-32). Although Spevack is silent as to the recited "cascade" configuration for the conventional water distillation system, it would have been an obvious design choice for one of ordinary skill in the art at the time the invention was made to select the recited cascade configuration for the distillation system in the apparatus of Spevack, because use of cascade distillation column configurations is conventionally known in the art for the concentration or enrichment of components within process streams, as evidenced by Tervoort et al. OR Carney. (The same comments with respect to Tervoort et al and Carney apply -- see items 2 and 4 above). Additionally, the isotope concentrating system (I) may comprise a mono-temperature concentrating system having a phase converter (burner) **204** in which a desired isotope and a supply of oxygen and/or hydrogen, as required, are recombined by combustion to

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form liquid water (column 4, lines 33-46). Therefore, the modified apparatus of Spevack substantially comprises the "hydrogenation device" as instantly recited. Lastly, the feed isotope regenerator (II) conducts an isotope exchange with the isotope-impooverished stream discharged from system (I), such that the stream's supply of the desired isotope (i.e., oxygen and/or hydrogen) is replenished and then returned to system (I). Therefore, system (II) is inherently connected by a return conduit to at least one of said distillation columns in the modified apparatus of Spevack, and substantially comprises the instantly recited "isotope scrambler" (column 3, lines 45-55; column 5, lines 19-36).

7. Claims 47 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spevack (US 4,788,051) in view of Tervoort et al. (US 3,625,835) OR Carney (US 1,957,818), as applied to claims 45 and 46 above, and further in view of Glitsche et al. (US 3,969,447) OR Chen et al. (US 4,604,247).

Regarding claims 47 and 50, the same comments with respect to Spevack, Tervoort et al, Carney, Glitsche et al, and Chen et al. apply.

Response to Arguments

8. Applicant's arguments with respect to claims 45-52 have been considered but are moot in view of the new ground(s) of rejection, as necessitated by amendment.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

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MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951.

The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on 703-308-6824. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jennifer A. Leung
October 30, 2003



**HIEN TRAN
PRIMARY EXAMINER**